

Sample document for authors using L^AT_EX to prepare AGU manuscripts

Geoffrey M. Kay, Karen Jamison,¹ William F. Johnson, Thomas Ryan,²
Sara C. Wilson, and Justin Smith

Woods Hole Oceanographic Institution, Woods Hole, Massachusetts

J. Blythe and M. Chen¹

*Observation Center for Prediction of Earthquakes and Volcanic Eruptions, Faculty of Science, Tohoku University,
Sendai, Japan*

L. Song

Woods Hole Oceanographic Institution, Woods Hole, Massachusetts

This tutorial includes codes and explanations which will not print in an ordinary L^AT_EX document. Also included are samples of marked-up equations, tables, and figure captions. In order to use this tutorial you should view or print it using an editor or a word processing program.

1. INTRODUCTION

A focal problem today in the dynamics of globular clusters is core collapse. It has been predicted by theory for decades [Baker et al., 1977; *Barbour and Major*, 1977; *Bell*, 1972], but observation has been less alert to the phenomenon. For many years the central brightness peak in M15 [*Brosche and Sunderman*, 1977; *Yamazaki*, 1978] seemed a unique anomaly.

2. RAGGED RIGHT LEVEL 1 HEAD LONGER THAN ONE LINE WITH A FLUSH LEFT WRAPAROUND

Then *Higgins* [1968] suggested a central peak in NGC 6397, and limited photographic surveys of *Degges and Smith* [1977] and *Golitsyn and Mokhov* [1978] were conducted, including NGC 6624, whose sharp center had often been noted [e.g., *Namias*, 1974].

3. RAGGED RIGHT LEVEL 1 HEAD LONGER THAN ONE LINE WITH A FLUSH LEFT WRAPAROUND LINE AND *ITALIC* TEXT

All our observations were short direct exposures with CCDs. At Central Observatory we used a TI 500×500 chip and a GEC 575×385 on the 1-m Nickel reflector. The only filter available at Central was red. At CTIO we used a GEC 575×385 with *B*, *V*, and *R* filters and an RCA 512×320 with *U*, *B*, *V*, *R*, and *I* filters on the 1.5-m reflector.

The CCD images are unfortunately not always suitable for very poor clusters or for clusters with large cores, as seen in section 4.

A number of star count profiles [*Kennealy and Caledonia*, 1979] as well as photoelectric profiles [*McMullen*, 1978] were reviewed. In a few cases we judged normality by eye estimates on one of the Sky Surveys.

4. A LEVEL ONE HEAD

It has been realized that helicity amplitudes provide a convenient means for diagram evaluations. These amplitude level techniques are particularly convenient for calculations involving many diagrams, where the usual trace techniques for the amplitude squared become unwieldy. Our calculations use helicity techniques [*Hagiwara and Zeppenfeld*, 1986]; we summarize below.

4.1. Formalism

A three-level amplitude in e^+e^- collisions can be expressed in terms of fermion strings of the form

$$\bar{v}(p_2, \sigma_2) P_{-\tau} \not{\epsilon}_1 \not{\epsilon}_2 \cdots \not{\epsilon}_n u(p_1, \sigma_1), \quad (1)$$

where p and σ label the initial e^\pm four momenta and helicities ($\sigma = \pm 1$), $\not{\epsilon}_i = a_i^\mu \gamma_\mu$, and $P_\tau = \frac{1}{2}(1 + \tau \gamma_5)$ is a chirality projection operator ($\tau = \pm 1$). The a_i^μ may be formed from particle four momenta, gauge boson polarization vectors, or fermion strings with an uncontracted Lorentz index associated with final state fermions.

4.2. A Level Two Head

In the chiral representation the γ matrices are expressed in terms of 2×2 Pauli matrices σ and the unit matrix 1 as

$$x_1 = (x - x_0) \cos \Theta + (y - y_0) \sin \Theta \quad (2)$$

$$y_1 = -(x - x_0) \sin \Theta + (y - y_0) \cos \Theta. \quad (3)$$

$$\gamma^\mu = \begin{pmatrix} 0 & \sigma_+^\mu \\ \sigma_-^\mu & 0 \end{pmatrix}, \quad \gamma = \begin{pmatrix} -1 & 0 \\ 0 & 1 \end{pmatrix}, \quad (1a)$$

$$\sigma_\pm^\mu = (\mathbf{1}, \pm\sigma), \quad (1b)$$

giving

$$\not{a} = \begin{pmatrix} 0 & (\not{a})_+ \\ (\not{a})_- & 0 \end{pmatrix}, \quad (\not{a})_\pm = a_\mu \sigma_\pm^\mu, \quad (1c)$$

4.2.1. Level three heads capitalize only the first letter of the first word, indent one-em space, and end with a period. The spinors are expressed in terms of two-component Weyl spinors as

$$u = \begin{pmatrix} (u)_- \\ (u)_+ \end{pmatrix}, \quad v = ((v)_+^\dagger, (v)_-^\dagger). \quad (17b)$$

All four cameras had scales of the order of 0.4 arc sec/pixel, and our field sizes were around 3 arc min. The Weyl spinors are given in terms of helicity eigenstates $\chi_\lambda(p)$ with $\lambda = \pm 1$ by

$$\begin{aligned} u(p, \lambda)_\pm &= (E \pm \lambda |\mathbf{p}|)^{1/2} \chi_\lambda(p), \\ v(p, \lambda)_\pm &= \pm \lambda (E \mp \lambda |\mathbf{p}|)^{1/2} \chi_{-\lambda}(p). \end{aligned} \quad (2)$$

4.2.1.1. Level four heads capitalize only the first letter of the first word, indent one-em space, and end with a colon. These spinors are expressed in terms of two-component Weyl spinors as

$$u = \begin{pmatrix} (u)_- \\ (u)_+ \end{pmatrix}, \quad v = ((v)_+^\dagger, (v)_-^\dagger). \quad (3)$$

The Weyl spinors are given in terms of helicity eigenstates $\chi_\lambda(p)$ with $\lambda = \pm 1$ by

$$\begin{aligned} u(p, \lambda)_\pm &= (E \pm \lambda |\mathbf{p}|)^{1/2} \chi_\lambda(p), \\ v(p, \lambda)_\pm &= \pm \lambda (E \mp \lambda |\mathbf{p}|)^{1/2} \chi_{-\lambda}(p). \end{aligned} \quad (4)$$

The CCD images are unfortunately not always suitable for very poor clusters or for clusters with large cores.

5. FLOATING MATERIAL

Consider a task that computes profile parameters for a modified Lorentzian of the following form:

$$I = \frac{1}{1 + d_1^{P(1+d_2)}}, \quad (5)$$

where

$$d_1 = \frac{3}{4} \sqrt{\left(\frac{x_1}{R_{\text{maj}}} \right)^2 + \left(\frac{y_1}{R_{\text{min}}} \right)^2} \quad (6a)$$

$$d_2 = \frac{3}{4} \sqrt{\left(\frac{x_1}{PR_{\text{maj}}} \right)^2 + \left(\frac{y_1}{PR_{\text{min}}} \right)^2}. \quad (6b)$$

In these expressions, x_0, y_0 is the star center, and Θ is the angle with the x axis. Results of this task are shown in Table 1 and Table 2. It is not clear how these sorts of analyses may affect determination of M_{\odot} and M_{\oplus} , but the assumption is that the alternate results should be less than 90° out of phase with previous values. We have no observations of Ca II.

Table 1

Table 2

APPENDIX A: YOUR TITLE

Consider a task that computes profile parameters for a modified Lorentzian of the form

$$I = \frac{1}{1 + d_1^{P(1+d_2)}}, \quad (A1)$$

where

$$d_1 = \frac{3}{4} \sqrt{\left(\frac{x_1}{R_{\text{maj}}} \right)^2 + \left(\frac{y_1}{R_{\text{min}}} \right)^2} \quad (A2a)$$

$$d_2 = \frac{3}{4} \sqrt{\left(\frac{x_1}{PR_{\text{maj}}} \right)^2 + \left(\frac{y_1}{PR_{\text{min}}} \right)^2} \quad (A2b)$$

which leaves us with the conclusion that

$$x_1 = (x - x_0) \cos \Theta + (y - y_0) \sin \Theta \quad (A2c)$$

$$y_1 = -(x - x_0) \sin \Theta + (y - y_0) \cos \Theta. \quad (A2d)$$

APPENDIX B: ONE LAST EQUATION

For completeness, here is one last equation

$$e = mc^2. \quad (B1)$$

Notice how the equation numbering and lettering is re-set when a new appendix section is added.

NOTATION

- b type notation text describing the letter “b.”
- a' type notation text describing “a’.”
- f type notation text describing the letter “f.”
- O₂ type notation text describing “O₂.”
- K** type notation text describing the boldface “**K**.”
- g type notation text describing the letter “g.”

Acknowledgments. We are grateful to V. Barger, T. Han, and R. J. N. Phillips for doing the math in the formalism section.

The Editor would like to thank the reviewer of this manuscript.

REFERENCES

- Baker, K. D., D. J. Baker, J. C. Ulwick, and A. T. Stair Jr., Infrared enhancements associated with a bright auroral breakup, *J. Geophys. Res.*, **82**, 3518-3528, 1977.
- Barbour, M. G., and J. Major (Eds.), *Terrestrial Vegetation of California*, 1002 pp., John Wiley, New York, 1977.
- Bell, R. J. *Introductory Fourier Transform Spectroscopy*, 329 pp., Academic, San Diego, Calif., 1972.
- Brosche, P., and J. Sunderman, Effects of oceanic tides on the rotation of the Earth, in *Scientific Applications of Lunar Laser Ranging*, edited by J. D. Mulholland, pp. 133-141, D. Reidel, Norwell, Mass., 1977.
- Degges, T. C., and H. J. P. Smith, A high altitude infrared radiance model, *Tech. Rep. AFGL-TR-77-02721, AD-A059242*, 25 pp., Air Force Geophys. Lab., Bedford, Mass., 1977.
- Golitsyn, G., and I. Mokhov, Stability and extremal properties of climate models, *Izv. Russ. Acad. Sci. USSR Atmos. Oceanic Phys.*, Engl. Transl., **31**, 781-787, 1995.
- Higgins, M. W., Geologic map of the Brevard fault zone near Atlanta, Georgia, scale 1:48,000, *U.S. Geol. Surv. Geol. Invest. Map*, *I-511*, 1968.
- McMullen, R. J., The effect of geothermal gradients on non-linear creep deformations in the lithosphere, M.A. thesis, 256 pp., State Univ. of N.Y. at Buffalo, May 1978.
- Namias, J., Suggestions for research leading to long range precipitation forecasting for the tropics, paper presented at International Tropical Meteorology Meeting, Am. Meteorol. Soc., Nairobi, Jan. 31 to Feb. 7, 1974.
- Poppe, B., and R. Zwickl, Internet education by Space Environment Laboratory (abstract), *Eos Trans. AGU*, **76**(17), Spring Meet. Suppl., S210, 1995.
- Stair, A. T., Jr., Cryogenic spectrometry for the measure of airglow and aurora, *Proc. Soc. Photo. Opt. Instrum. Eng.*, **91**, 71-75, 1976.
- Yamazaki, Y., Resistivity change at Aburatsubo caused by the earthquake of magnitude 7.0 on January 17, 1978 (in Japanese), *J. Seismol. Soc. Jpn.*, **31**, 230-233, 1978.

J. Blythe, Observation Center for Prediction of Earthquakes and Volcanic Eruptions, Faculty of Science, Tohoku University, Sendai 980, Japan.

M. Chen and K. Jamison, U.S. Geological Survey, 345 Middlefield Road, MS 977, Menlo Park, CA 94025. (e-mail: k.jamison@gold.wr.usgs.gov)

W. F. Johnson, G. M. Kay, T. Ryan, J. Smith, L. Song, and S. C. Wilson, Department of Geology and Geophysics, Woods Hole Oceanographic Institution, Woods Hole, MA 02543. (e-mail: wj@red.whoi.edu; gk@blue.whoi.edu; tr@blue.whoi.edu; js@red.whoi.edu; ls@red.whoi.edu; sw@red.whoi.edu)

¹Now at U.S. Geological Survey, Menlo Park, California.

²Also at Observation Center for Prediction of Earthquakes and Volcanic Eruptions, Faculty of Science, Tohoku University, Sendai, Japan.

Figure 1. We use the `LATEX figure` environment to set figure captions. Figure captions consist of a paragraph containing several sentences or phrases.

Figure 1. We use the `LATEX figure` environment to set figure captions. Figure captions consist of a paragraph containing several sentences or phrases.

Figure 17c. AGU asks authors to submit two sets of captions. Authors may change the width of the first set of captions using a “figurewidth” command, but the second set of captions will always print at the correct double-column width for your journal. The first caption for this figure will print at a width of 13 picas.

Figure 17c. AGU asks authors to submit two sets of captions. Authors may change the width of the first set of captions using a “figurewidth” command, but the second set of captions will always print at the correct double-column width for your journal. The first caption for this figure will print at a width of 13 picas.

Figure 1. We use the `LATEX figure` environment to set another figure caption. This caption was preceded by commands that reset the figure number and the figure width. The figure number is reset to “one” and the first figure caption width is set to 25 picas.

Figure 1. We use the `LATEX figure` environment to set another figure caption. This caption was preceded by commands that reset the figure number and the figure width. The figure number is reset to “one” and the first figure caption width is set to 25 picas.

Plate 7c. Use a `LATEX plate` environment to set plate captions. This plate caption contains commands that reset the plate number to “7c” and the first plate caption width to 41 picas. Figure captions accompany black and white line art or gray scale artwork, while plate captions accompany color artwork.

Plate 7c. Use a `LATEX plate` environment to set plate captions. This plate caption contains commands that reset the plate number to “7c” and the first plate caption width to 41 picas. Figure captions accompany black and white line art or gray scale artwork, while plate captions accompany color artwork.

Table 1. Planotable with Examples of Footnotes

Event	Height, km	d_x	d_y	n	χ^2	R_{maj}	R_{min}	P^{a}	PR_{maj}	PR_{min}	Θ^{b}
1	33472.5	-0.1	0.4	53	27.4	2.065	1.940	3.900	68.3	116.2	-27.639
2	27802.4	-0.3	-0.2	60	3.7	1.628	1.510	2.156	6.8	7.5	-26.764
3	29210.6	0.9	0.3	60	3.4	1.622	1.551	2.159	6.7	7.3	-40.272
4	32733.8	-1.2	-0.5	41	54.8	2.282	2.156	4.313	117.4	78.2	-35.847
5	9607.4	-0.4	-0.4	60	1.4	1.669	1.574	2.343	8.0	8.9	-33.417
6	31638.6	1.6	0.1	39	315.2	3.433	3.075	7.488	92.1	25.3	-12.052

^aSample footnote for Table 1.^bAnother sample footnote for Table 1.

Table 33a. Planotable With Multicolumn Commands

	Length		Distance	
	0 mK	3 mK	0 mK	3 mK
Height off	20	21	22	23
Seabed, m	10	11	12	13

Occasionally, authors may wish to append a short paragraph of explanatory notes which pertain to an entire table but are different than the caption. Such notes may be placed in a “`tablenotetext`” environment with a “null” argument as demonstrated in this example.

Table 7. Literature Data for Program Stars

Star	V	b-y	m ₁	c ₁	Source	T _{eff}	log g	v _{turb}	[Fe/H]	Source
HD 97	9.7	0.51	0.15	0.35	8	...	...	...	-1.50	2
						5015	...	...	-1.50	10
						5000	2.50	2.4	-1.99	5
						5120	3.00	2.0	-1.69	7
						4980	...	...	-2.05	10
HD 4306	9.0	0.52	0.05	0.35	19, 2	...	...	...	-2.70	2
						5000	1.50	1.8	-2.65	14
						4950	2.10	2.0	-2.92	8
						5000	2.25	2.0	-2.83	18
						...	...	...	-2.80	1
HD 84937	8.3	0.30	0.06	0.35	4, 11	6200	...	...	-2.10	4
						6216	...	...	-2.42	11
						6240	...	...	-2.13	3
						...	...	...	-2.14	1
						6200	3.60	1.5	-2.43	16
						6250	4.00	...	-2.10	3
<i>This Is a Center Head</i>										
HD 87140	9.0	0.48	0.12	0.28	7	5000	4.50	1.0	-1.41	7
						...	...	...	-1.56	1
						4500	1.10	2.8	-2.77	5

Table 7. (continued)

Star	V	b−y	m ₁	c ₁	Source	T _{eff}	log g	v _{turb}	[Fe/H]	Source
HD 94028	8.2	0.34	0.08	0.25	12, 15	5795	4.00	...	−1.70	3
						4500	0.80	3.2	−2.65	14
						4600	...	...	−2.75	10
						5860	...	...	−1.70	4
						5910	3.80	...	−1.76	15
						5900	...	...	−1.57	3
						...	...	...	−1.32	1
HD 97916	9.2	0.29	0.10	0.41	13, 14	6125	4.00	...	−1.10	3
						5950	...	...	−1.50	17
						6204	...	...	−1.36	11
<i>At Least Two Center Heads Are Required if Any Are Used</i>										
+26°2606	9.7	0.34	0.05	0.28	5, 6	5980	...	...	< −2.20	19
						5950	...	...	−2.89	9
+26°3578	9.4	0.31	0.05	0.37	10	5830	...	...	−2.60	4
						5800	...	...	−2.62	17
						6177	...	...	−2.51	11
						6000	3.25	...	−2.20	3
						6140	3.50	...	−2.57	15
+37°1458	8.9	0.44	0.07	0.22	9, 16	4260	...	...	−1.55	10
						5296	...	...	−2.39	11
						5420	...	...	−2.43	3
						5000	1.10	2.2	−2.71	14
						5000	2.20	1.8	−2.46	5
G5−36 ^a	10.8	0.40	0.07	0.28	3, 17	...	...	...	−1.19	1
						4980	...	...	−2.55	10
						...	...	...	−2.03	1
						6020	...	...	−1.56	3
LP 608−62 ^b	10.5	0.30	0.07	0.35	1, 18	6250	...	...	−2.70	4

Sources: 1, *Barbuy et al.* [1985]; 2, *Bond* [1980]; 3, *Carbon et al.* [1987]; 4, *Hobbs and Duncan* [1987]; 5, *Gilroy et al.* [1988]; 6, *Gratton and Ortolani* [1986]; 7, *Gratton and Sneden* [1987, 1988, 1991]; 8, *Kraft et al.* [1982]; 9, *Laird* [1990]; 10, *Leep and Wallerstein* [1981]; 11, *Luck and Bond* [1981, 1985]; 12, *Magain* [1987, 1989]; 13, *Peterson* [1981]; 14, *Peterson et al.* [1990]; 15, *Royce et al.* [1988]; 16, *Schuster and Nissen* [1988a, b]; 17, *Spite et al.* [1984]; 18, *Spite and Spite* [1986]; 19, *Hobbs and Thorburn* [1991]. Only one paragraph of material is permitted at the end of a table (excluding superscripted footnotes), so if both references and notes exist, they should be run in together.

^aThis is another example of a footnote.

^bStar LP 608−62 is also known as BD+1°2341p.

Table A1. Example of an Appendix Table

From	To	dl/dt , mm/yr	
		Observed	Model
Alamillo	Palvadero	$0.6 + 0.8$	1.4
Campana	Canas	$0.4 + 1.1$	-0.7
	Chupadera	$-0.5 + 1.0$	0.2

Occasionally, authors may wish to append longer paragraphs of explanatory notes which pertain to an entire table but are different from the caption. These notes may be placed in a “tablecomments” environment as demonstrated in this example. Note that this table uses the “tablenum” command since it needs a letter “A” in the table caption.

Table A2. Example of a Table in a Tabular Environment

From	To	dl/dt , mm/yr	
		Observed	Model
Alamillo	Palvadero	$0.6 + 0.8$	1.4
Campana	Canas	$0.4 + 1.1$	-0.7
	Chupadera	$-0.5 + 1.0$	0.2

This table is an example of L^AT_EX’s `table` and `tabular` environments. Blank columns have been added to force the table width closer to 20 picas.

LATEX SAMPLE DOCUMENT FOR AGU MANUSCRIPTS

KAY ET AL.

LATEX SAMPLE DOCUMENT FOR AGU MANUSCRIPTS

KAY ET AL.

LATEX SAMPLE DOCUMENT FOR AGU MANUSCRIPTS

KAY ET AL.

LATEX SAMPLE DOCUMENT FOR AGU MANUSCRIPTS

KAY ET AL.

LATEX SAMPLE DOCUMENT FOR AGU MANUSCRIPTS

KAY ET AL.

LATEX SAMPLE DOCUMENT FOR AGU MANUSCRIPTS

KAY ET AL.

LATEX SAMPLE DOCUMENT FOR AGU MANUSCRIPTS

KAY ET AL.

LATEX SAMPLE DOCUMENT FOR AGU MANUSCRIPTS

KAY ET AL.

LATEX SAMPLE DOCUMENT FOR AGU MANUSCRIPTS

KAY ET AL.

LATEX SAMPLE DOCUMENT FOR AGU MANUSCRIPTS

KAY ET AL.

LATEX SAMPLE DOCUMENT FOR AGU MANUSCRIPTS

KAY ET AL.

LATEX SAMPLE DOCUMENT FOR AGU MANUSCRIPTS

KAY ET AL.

LATEX SAMPLE DOCUMENT FOR AGU MANUSCRIPTS

KAY ET AL.